

DETAILED ACTION

1. The amendment filed on 8/14/07 has been fully considered and made of record in the instant application.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 9/14/07 was filed before the mailing date of the final rejection on 10/27/07. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Response to Arguments

3. Applicant's arguments filed 8/14/07 have been fully considered but they are not persuasive.

In regards to Krames discloses a plurality of geometric patterns are generated in the surface of the semiconductor layer, the plurality of geometric patterns including a plurality of different geometric patterns. It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the different geometric patterns for the triangular shape of Krames, since changing the shape of the structure is an obvious **matter of design choice within ordinary skill in the art** and it is noted that in the instant specification does not describe different geometric patterns as essential or critical or the only shape that could operate the claimed invention. The random or different geometric patterns as stated by the applicant is not new to the

semiconductor industry as shown in Schnitzer et al. in Applied Physics Letters 63,2174 (1993). Thus, Schnitzer proves that random patterns in a semiconductor layer works in a light emitting device. Therefore, one of ordinary skill in the art would modify the patterns of Krames to have random or different geometric patterns causing a change in the direction of light emitted by a chip. Also, there is no novelty in have random patterns in a semiconductor material of a light emitting device as shown by Schnitzer.

In regards to the essential or critical features disclosed in the specification. Every novel recitation of a claim does not have to be recited in the specification. However, based on the original specification the examiner did not find the random patterns as being a **critical feature** to applicant's invention since one skilled in the art would know to modify the shape of the patterns to have a random configuration.

Applicant alleges that Krames fails to disclose a laser light technique, which a mask material is removed by a laser. This is deemed unpersuasive because Krames teaches a UV radiation to remove the mask layer. It is well known in the semiconductor laser technology that UV radiation is created by a laser light to formed patterns as evident by Yang (US2006/0269853) (see paragraph 38) and Traskos et al. (US 4,915,981) (see col. 2 lines 56-65).

This action is made **final**.

Drawings

4. The drawings were received on 8/14/07. These drawings are approved by the examiner.

Specification

5. The disclosure is objected to because of the following informalities: references numeral 315 is missing on page 15 of the specification.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1, 4, 12, 13, 21, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krames et al. (US 5,779,924).

With respect to Claims 1 and 21, Krames discloses shaping a surface of a semiconductor layer 1 utilizing a laser to define three-dimensional geometric patterns in

the layer 1. The shaping of a surface of the semiconductor layer utilizing a laser to define three dimensional geometric patterns in the semiconductor layer comprises: patterning a mask layer 5 (i.e. photo sensitive thin film) on the semiconductor layer 1 using a laser (i.e. UV radiation from a laser) to remove mask material, wherein patterning the mask layer comprises applying laser light to the mask layer at an energy sufficient to remove material from the mask layer. Etching the semiconductor layer 1 using the patterned mask layer 5 to define the three dimensional geometric patterns (col. 6 lines 66 and 67, col. 7 lines 1-67, and col. 8 lines 12-49; Figs. 6, 7a-7c, 8-11, and 13). Krames discloses the claimed invention except for the plurality of geometric pattern including a plurality of different geometric patterns (i.e. randomization features). However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the different geometric patterns for the triangular shape, since changing the shape of the structure is an obvious matter of design choice within ordinary skill in the art and the difference in shape of the structure does not make the device operating differently. In re Peters, 723 F.2d 891, 221 USPQ 952 (Fed. Cir. 1983). Furthermore, it is noted that in the instant specification does not describe different geometric patterns as essential or critical or the only shape that could operate the claimed invention.

With respect to Claim 4, Krames discloses wherein the semiconductor layer comprises the substrate 3 (see Figs. 8-11).

With respect to Claim 12, Krames discloses wherein a plurality of geometric pattern are provided in the surface of the semiconductor layer, wherein the geometric

patterns extending into the semiconductor layer and having uninterrupted perimeters at a same level of the semiconductor layer (see Figs. 6, 7a-7c, 8-11, and 13).

With respect to Claims 13 and 26, Krames discloses wherein the surface of the substrate is on a side of the substrate opposite the light-emitting element 20 (i.e. the combination of the plurality of layers). The light-emitting element is on the substrate (see Figs. 13 and 14).

8. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krames et al. (US 5,779,924) in view of Suehiro et al. (EP 1263058).

With respect to Claims 5 and 6, Krames discloses the claimed invention except for the substrate comprising a silicon carbide or sapphire. However, Suehiro discloses a substrate comprising a silicon carbide or sapphire for a light-emitting element (see paragraphs 60-64, 68, and 75). Thus, Krames and Suehiro have substantially the same environment of light-emitting element with patterned semiconductor layer. Therefore, one skilled in the art would readily recognize incorporating a sapphire or silicon carbide as a material for the substrate of Krames, since the sapphire or silicon carbide material would provide a reliable material for transmission of light for the light emitting element as taught by Suehiro.

9. Claims 23, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krames et al. (US 5,779,924) as applied to claim 1 above, and further in view of Jeong et al. (US 6,943,117).

With respect to Claims 23 and 25, Krames discloses the claimed invention except for the mask comprising a polymer mask. The patterning a master template with

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a laser and embossing the mask layer using the master template. However, Jeong discloses a mask comprising a polymer mask 20 for forming apertures in a layer of material. Patterning a master template 10 with a laser and embossing the mask layer using the master template (see col. 6 lines 55-67 and col. 7 lines 20-30; Figs. 1A-1F). Thus, Krames and Jeong have substantially the same environment of a mask used to form apertures in layer of material. Therefore, one skilled in the art at the time of the invention would readily recognize incorporating a polymer material as the material for the mask of Krames, since the polymer material would facilitate in the desired apertures formed by a laser in the layer of material as taught by Jeong.

With respect to Claims 26 and 27, the combination of Krames and Jeong discloses wherein forming the light-emitting element of Krames (see Figs. 6, 7a-7c, 8-11, and 13) is carried out subsequent to shaping the surface of the substrate in Jeong (see Figs. 1 and 2).

10. Claims 46, 48-52, and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krames et al. (US 5,779,924) in view of Suehiro et al. (EP 1263058) and Watanabe (US2007/0080365).

With respect to Claims 46, Krames discloses patterning a mask layer on a substrate 3 using a laser to remove material from the mask layer 5. Etching the substrate 3 using the patterned mask layer to define the three dimensional geometric patterns (col. 6 lines 66 and 67, col. 7 lines 1-67, and col. 8 lines 12-49; Figs. 6, 7a-7c, 8-11, and 13). Krames discloses the claimed invention except for the plurality of geometric pattern including a plurality of different geometric patterns (i.e. randomization

features). However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the different geometric patterns for the triangular shape, since changing the shape of the structure is an obvious matter of design choice within ordinary skill in the art and the difference in shape of the structure does not make the device operating differently. In re Peters, 723 F.2d 891, 221 USPQ 952 (Fed. Cir. 1983). Furthermore, it is noted that in the instant specification does not describe different geometric patterns as essential or critical or the only shape that could operate the claimed invention. Krames fails to explicitly disclose the substrate made of silicon carbide. However, Suehiro discloses a substrate made of silicon carbide (see paragraphs 60-64). Thus, Krames and Suehiro have substantially the same environment of a three dimensional geometric patterns in a semiconductor layer in an optical device. Therefore, one skilled in the art at the time of the invention would readily recognize substitute a silicon carbide substrate for the substrate of Krames, since the silicon carbide substrate provides a stable material for a substrate when creating three dimensional geometric patterns as taught by Suehiro.

With respect to Claim 48, Krames discloses wherein the surface of the substrate is on a side of the substrate opposite the light-emitting element 20 (i.e. the combination of the plurality of layers) (see Figs. 13 and 14).

With respect to Claim 49, it is inherently in the composition characteristic of the mask layer and silicon carbide substrate, that the shape of the pattern of the mask layer is based on a difference between at etch rate of the silicon carbide substrate and an etch rate of the mask layer.

With respect to Claim 50, Krames discloses forming a micro-mask between the mask layer and the silicon carbide substrate of Suehiro. The micro-mask is configured to roughen a surface of the substrate during etching (see col. 7 lines 33-45).

With respect to Claim 51, Krames discloses a micro-mask comprises a metal. It is well known in the semiconductor industry that aluminum is a metal that can be used in a light-emitting device as evident by Watanabe (see paragraph 27).

With respect to Claims 52 and 53, Krames discloses a single etch and in a single patterning of the mask layer to form a three-dimensional geometric shaped (col. 6 lines 66 and 67, col. 7 lines 1-67, and col. 8 lines 12-49; Figs. 6, 7a-7c, 8-11, and 13). However, Krames fails to disclose the plurality of geometric pattern including a plurality of different geometric patterns (i.e. randomization features). It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the different geometric patterns for the triangular shape, since changing the shape of the structure is an obvious matter of design choice within ordinary skill in the art and the difference in shape of the structure does not make the device operating differently. In re Peters , 723 F.2d 891, 221 USPQ 952 (Fed. Cir. 1983). Furthermore, it is noted that in the instant specification does not describe different geometric patterns as essential or critical or the only shape that could operate the claimed invention.

11. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Krames et al. (US 5,779,924) and Suehiro et al. (EP 1263058) as applied to claim 46 above, and further in view of Boehlen et al. (Laser Micro-machining article).

With respect to Claim 47, Krames-Suehiro discloses the claimed invention except for the mask is a polymer mask. However, Boehlen discloses a mask comprising a polymer mask for forming apertures in a layer of material (see introduction and paragraphs 2.1 and 2.2; Fig. 1). Thus, Krames-Suehiro and Boehlen have substantially the same environment of a mask used to form apertures in layer of material. Therefore, one skilled in the art at the time of the invention would readily recognize incorporating a polymer material as the material for the mask of Krames-Suehiro, since the polymer material would facilitate in the desired apertures formed by a laser in the layer of material as taught by Boehlen.

The prior art made of record and not relied upon is cited primarily to show the process of the instant invention.

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (571) 272-1927.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956

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AC/October 27, 2007

/Alonzo Chambliss/
Primary Examiner, Art Unit 2814